BULL. BOT. SURV. INDIA
Vol. 11, Nos. 3 & 4 : pp. 277-285, 1969

A CONTRIBUTION TO THE FLORA OF TUWA IN PANCHMAHAL DISTRICT GUJARAT[1]

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ABSTRACT

The areas in vicinity of Tuwa village have been intensively explored from 1964-1968. During this period 539 angiosperms were collected of which 409 are dicotyledons and 130 monocotyledons. There are five new records for erstwhile Bombay Presidency and one new species. The vegetation is dominantly a scrub forest type but some components of dry deciduous forests are but rarely met with. A comparison of the flora of the present area is made with that of Pavagadh hill with a view to bring out differences between the two areas which are topographically different.

INTRODUCTION

The flora of some forests in the hilly regions of Panchmahal district such as Lunawada (Saxton, 1922), Devghadbaria (Saxton[2]) and Ratanmahal (Chavan and Bedi, 1966; Bedi, 1968) is known to some extent but it is better known for Pavagadh hill (Shah and Inamdar 1965; Chavan and Oza 1966; Bedi, Sabnis and Bhatt 1968; Chohan and Shah, in press). However, it seems that no such work is undertaken in the plains of the district. A study of this type would be helpful in comparing the flora of the hilly regions with that of plains. With this end in view the authors studied the flora of Tuwa and its environ. The selection of the area was made as a matter of convenience. Intensive explorations in different seasons of the year were carried out from 1964 to 1968. We have been able to record 5 new plants for the erstwhile Bombay Presidency and 1 new species (Chohan, Shah and Deshpande, 1967; Shah and Deshpande, 1968; Deshpande and Shah, 1968). About 539 species have been listed in this paper of which 409 are dicotyledons and 130 monocotyledons. The nomenclature adopted is the one published in the current authentic, taxonomical literature. The herbarium specimens, which served as a basis for this paper, are housed in the Botany Department, S. P. University, Vallabh Vidyanagar.

GEOGRAPHY AND CLIMATE OF THE AREA

Tuwa is a small village in N. W. part of Panchmahal district in eastern Gujarat, situated 22°49′ N and 73°27′ E at an elevation of about 26 m above Mean Sea Level. It is a small railway station on Anand-Godhra line of the Western Railway, about 30 km south of Godhra. It is also approachable by the State Transport buses which regularly ply between Anand and Godhra along the highway which runs within the limits of the areas explored, almost parallel to the railway line. Tuwa is also famous in Gujarat for its hot water springs, which are at a distance of only about one kilometer from Tuwa station. Topographically the area is a plain country traversed by three main rivers—Khari, Moro and Bochad and their tributaries. The soil is mostly alluvial, varying in colour from pale to dark brown. The river beds are gravelly or pebbly at some places The hottest months are March-May, October being a close second. The rainy season starts in the middle of June or beginning of July and lasts till September. The average annual rainfall is about 697.14 mm. The cold season is from November to February but December-January are the coldest months.

SOME ASPECTS OF THE VEGETATION OF THE AREA

The vegetation of the hilly regions of Panchmahal district is of a dry deciduous type (Saxton and Sedgwick, p. 228), but in the present area, it is an open arid scrub forest. Even then, some trees like *Butea monosperma* Taub. and *Tectona grandis* L.f., which often form a dominant vegetation in dry deciduous forests, are common. The other members which are also frequent components of such forests are but rarely met with. They are *Bombax ceiba* L., *Buchanania lanzan* Spr., *Bridelia squamosa* Gehrm., *Diospyros melanoxylon* Roxb.,

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[1] Based on the Ph. D. Thesis approved by S. P. University, Vallabh Vidyaragar.

[2] Unpublished collection housed in Gujarat College Herbarium, Ahmedabad.

Dolichandrone falcata var. *lawii* Haines, *Gmelina arborea* Roxb., *Ixora brachiata* Roxb., *Miliusa tomentosa* Sincl., *Mitragyna parvifolia* Korth., *Soymida febrifuga* A. Juss., *Sterculia urens* Roxb. and *Terminalia crenulata* Roth. This may therefore, suggest that the vegetation of the present area must have been in the past similar to the one found in the hilly region. However the dominance of thorny trees and shrubs can be attributed to biotic causes operating for the last many years. The local people indiscriminately cut down valuable trees and shrubs for fuel and other domestic purposes. The trees like *Butea monosperma* Taub., *Tectona grandis* L. f. etc. are seldom allowed to grow by themselves in many places and, as a result, they remain stunted, only up to 1.5 m tall. Along railway lines vast stretches of land are covered with mixed scattered patches of the stunted forms of these trees. At times *Diospyros melanoxylon* Roxb., *Holarrhena antidysenterica* Wall. ex DC., *Maytenus emarginata* Hou, are also found in these patches. Further, the cattle graze at random, causing a number of tree and shrub seedlings and herbs to disappear.

A comparison of the vegetation of the present area with that of the Pavagadh hill, will not be out of place. Though the vegetation of the hill is of a dry deciduous type, some members of the scrub forest such as *Acacia nilotica* ssp. *indica* Brenan, *Balanites aegyptiaca* Del., *Dichrostachys cinerea* W. & A., *Maytenus emarginata* Hou, *Zizyphus nummularia* W. & A. etc., which are common in our area, are also found at the foot and on hilly slopes. The dry deciduous nature of the forests of the hill has been preserved because of very much less, or practically no, biotic interference. Chavan and Oza (p. 5) have rightly remarked "The area of this isolated hill has been declared 'unworkable area'—'forest reserve' by the forest department." This is left to the nature and hence the luxuriant growth of the vegetation which as a consequence is not disturbed by fire, ploughing, grazing by sheep and other animals.

Though the area selected by us is rather limited, about 6 km radius from Tuwa railway station, covering some neighbouring villages like Vaganpur, Kankanpur, Vavadikhurd, Ratanpur, Vanjari, Chachpur, Goli and Dhonol, the flora of our area is rich, as can be judged from the following table showing 12 most abundant families in the present area and their relative positions in the flora of Pavagadh. The numbers in parenthesis stand for the number of species represented in a family.

Sl.No.	Name of the family	Tuwa and its environs; elevation above mean sea level 26 m	Pavagadh hill; elevation 738 m above the surrounding plains
1.	Leguminosae	1(78)	1(80)
2.	Gramineae	2(59)	2(73)
3.	Cyperaceae	3(42)	-(13)
4.	Compositae	4(26)	3(32)
5.	Convolvulaceae	5(21)	6(29)
6.	Malvaceae	6(17)	7(19)
7.	Euphorbiaceae	7(17)	5(27)
8.	Scrophulariaceae	8(15)	11(14)
9.	Acanthaceae	9(14)	4(25)
10.	Amaranthaceae	10(12)	10(16)
11.	Cucurbitaceae	11(11)	8(15)
12.	Labiatae	12(9)	9(14)

Total number of plants in the present area ... 539
Total number of plants in Pavagadh (so far reported or known) ... 570
Cultivated plants in the present area ... 30 approximately 5.5%
Cultivated plants in Pavagadh flora ... 20 approximately 3.5%

From the above table it will be seen that the first eleven most abundant families represented in Pavagadh flora are also comparatively better represented in our area, but the differences in the number of species in each family are obviously due to topography of the two areas and the biotic influence in the present area. For example the less number of grasses in Tuwa and its environs may be due to indiscriminate grazing by cattle. On the other hand the Cyperaceae and the other hydrophytes are very well represented in Tuwa but poorly so at Pavagadh. This is because the plain country of Tuwa and its environs is traversed by rivers, temporary ponds, puddles, ditches which support a good number of cyperaceous plants, along with other hydrophytes. Some of the noteworthy hydrophytes are: submerged—*Aponogeton natans* Engl., *Ceratophyllum demersum* L., *Hydrilla verticillata* Royle, *Najas minor* All., *N. kurziana* Rendle, *Potamogeton pectinatus* L. and *Vallisneria spiralis* L.; floating—*Ipomoea aquatica* Forsk., *Limnophyton obtusifolium* Miq., *Ludwigia adscendens* Hara, *Neptunia oleracea* Lour., Nymphaeaceae members, *Nymphoides cristatum* O.K., *N. indicum* O.K. etc. A number of amphibious plants including Cyperaceae were noted. A comparison of the flora of Tuwa with that of Pavagadh hill will also show that most of the plants are common in both the areas but some of them occurring in our area are not reported from Pavagadh and vice versa.

ENUMERATION

ANNONACEAE

Annona squamosa Linn.
Miliusa tomentosa (Roxb.) Sinclair

MENISPERMACEAE

Cissampelos pareira Linn.
Cocculus hirsutus (Linn.) Diels
Tinospora cordifolia (Willd.) Miers ex Hook. f. & Thoms.

NYMPHAEACEAE

Nelumbo nucifera Gaertn.
Nymphaea nouchali Brum. f.
N. stellata Willd.

PAPAVERACEAE

Argemone mexicana Linn.

BRASSICACEAE (CRUCIFERAE)

Brassica juncea Coss.
B. nigra (Linn.) Koch.
Lepidium sativum Linn.
Raphanus sativus Linn.

CAPPARACEAE

Cadaba fruticosa (Linn.) Druce
Capparis decidua (Forsk.) Edgew.
C. sepiaria Linn.
Cleome brachycarpa Vahl ex DC.
C. gynandra Linn.
C. simplicifolia (Camb.) Hook. f. & Thoms.
C. viscosa Linn.
Maerua oblongifolia A. Rich.

VIOLACEAE

Hybanthus enneaspermus (Linn.) F. Muell.

FLACOURTIACEAE

Flacourtia indica (Burm. f.) Merr.

POLYGALACEAE

Polygala chinensis Linn.
P. erioptera DC.

CARYOPHYLLACEAE

Polycarpaea corymbosa (Linn.) Lamk.
Polycarpon prostratum Aschers. & Schweinf.
Spergula arvensis Linn.
Vaccaria pyramidata Medic.

PORTULACACEAE

Portulaca oleracea Linn.
P. quadrifida Linn.

TAMARICACEAE

Tamarix ericoides Rottl.

ELATINACEAE

Bergia ammannioides Roxb.
B. odorata Edgew.
Elatine ambigua Wt.

MALVACEAE

Abelmoschus esculentus (Linn.) Moench.
A. ficulneus (Linn.) Wt. & Arn.
A. manihot (Linn.) Medic.
Abutilon indicum (Linn.) Sw.
Gossypium herbaceum Linn.
Hibiscus cannabinus Linn.
H. lobatus (Murr.) O. Kuntze
H. ovalifolius (Forsk.) Vahl
H. sabdariffa Linn.
H. vitifolius Linn.
Pavonia zeylanica (Linn.) Cav.
Sida cordifolia Linn.
S. spinosa Linn.
S. veronicaefolia Lamk.
Thespesia populnea (Linn.) Soland. ex Corr.
Urena lobata Linn.

BOMBACACEAE

Bombax ceiba Linn.

STERCULIACEAE

Helicteres isora Linn.
Melochia corchorifolia Linn.
Sterculia urens Roxb.
Waltheria indica Linn.

TILIACEAE

Corchorus aestuans Linn.
C. capsularis Linn.
C. fascicularis Lamk.
C. olitorius Linn.
Grewia flavescens Juss.
Triumfetta pentandra A. Rich.
T. rhomboidea Jacq.
T. rotundifolia Lamk.

LINACEAE

Linum usitatissimum Linn.

ZYGOPHYLLACEAE

Tribulus terrestris Linn.

OXALIDACEAE

Biophytum sensitivum (Linn.) DC.

RUTACEAE

Aegle marmelos (Linn.) Corr.
Citrus limon (Linn.) Burm. f.

Feronia limonia (Linn.) Swingle
Murraya koenigii (Linn.) Spreng.

SIMAROUBACEAE

Ailanthus excelsa Roxb.

BALANITACEAE

Balanites aegyptiaca (Linn.) Del.

MELIACEAE

Azadirachta indica A. Juss.
Soymida febrifuga A. Juss.

CELASTRACEAE

Celastrus paniculata Willd.
Maytenus emarginata (Willd.) D. Hou

RHAMNACEAE

Zizyphus mauritiana Lamk.
Z. nummularia (Burm. f.) Wt. & Arn.
Z. oenoplia (Linn.) Mill.
Z. xylopyrus (Retz.) Willd.

VITACEAE

Ampelocissus latifolia (Roxb.) Planch.
Cayratia carnosa (Lamk.) Gagnep.

SAPINDACEAE

Cardiospermum halicacabum Linn.

ANACARDIACEAE

Buchanania lanzan Spreng.
Lannea coromandelica (Houtt.) Merr.
Mangifera indica Linn.

MORINGACEAE

Moringa concanensis Nimmo
M. oleifera Lamk.

PAPILIONACEAE

Abrus precatorius Linn.
Aeschynomene indica Linn.
Alysicarpus bupleurifolius (Linn.) DC.
A. longifolius (Rottl. ex Spreng.) Wt. & Arn.
A. monilifer (Linn.) DC.
A. procumbens (Roxb.) Schindl.
A. scariosus Grah. ex Thw.
A. tetragonolobus Edgew.
A. vaginalis (Linn.) DC.
Arachis hypogaea Linn.
Atylosia platycarpa Benth.
A. scarabaeoides (Linn.) Benth.
Butea monosperma (Lamk.) Taub.
Cajanus cajan (Linn.) Millsp.
Canavalia gladiata (Jacq.) DC.
Cicer arietinum Linn.
Clitorea ternatea Linn.
Crotalaria albida Heyne ex Roth
C. burhia Buch.-Ham. ex Benth.
C. juncea Linn.
C. linifolia Linn. f.
C. medicaginea Lamk.
C. retusa Linn.
Cyamopsis tetragonoloba (Linn.) Taub.
Desmodium dichotomum (Willd.) DC.
D. gangeticum (Linn.) Willd.
D. triflorum (Linn.) DC.
Dolichos lablab Linn.
Eleiotis monophylla (Burm. f.) DC.
Heylandia latebrosa DC.
Indigofera astragalina DC.
I. cordifolia Heyne ex Roth
I. glandulosa Willd.
I. linifolia Retz.
I. linnaei Ali
I. oblongifolia Forsk.
I. tinctoria Linn.
I. trita Linn. f.
Medicago sativa Linn.
Melilotus indica All.
Mucuna prurita Hook. f.
Phaseolus aconitifolius Jacq.
P. angularis (Willd.) Wt.
P. radiatus Linn.
P. trilobus Ait.
Pongamia pinnata (Linn.) Pierre
Pueraria tuberosa (Roxb. ex Willd.) DC.
Rhynchosia minima (Linn.) DC.
R. aurea DC.
Sesbania bispinosa (Jacq.) W. F. Wight
Tephrosia purpurea (Linn.) Pers.
T. villosa (Linn.) Pers.
Teramnus labialis (Linn. f.) Spreng.
Trigonella foenum-graecum Linn.
Vigna unguiculata (Linn.) Walp.
Zornia gibbosa Span.

CAESALPINIACEAE

Bauhinia racemosa Lamk.
Cassia absus Linn.
C. auriculata Linn.
C. occidentalis Linn.
Cassia pumila Lamk.
C. siamea Lamk.
C. tora Linn.
Delonix elata (Linn.) Gamble
Tamarindus indica Linn.

MIMOSACEAE

Acacia jacquemontii Benth.
A. leucophloea (Roxb.) Willd.

Acacia nilotica (Linn.) Del. ssp. **indica** (Benth.) Brenan
A. pennata (Linn.) Willd.
A. senegal Willd.
Albizia lebbeck (Linn.) Benth.
Dichrostachys cinerea (Linn.) Wt. & Arn.
Mimosa hamata Willd.
Neptunia oleracea Lour.
Pithecellobium dulce (Roxb.) Benth.
Prosopis cineraria (Linn.) Druce
P. juliflora (Sw.) DC.

VAHLIACEAE

Vahlia digyna (Retz.) O. Kuntze

COMBRETACEAE

Anogeissus sericea Brandis
Combretum ovalifolium Roxb.
Quisqualis indica Linn.
Terminalia bellirica (Gaertn.) Roxb.
T. catappa Linn.
T. crenulata Roth

MYRTACEAE

Eucalyptus sp.
Psidium guajava Linn.
Syzygium heyneanym Wall. ex Gamble

LYTHRACEAE

Ammannia baccifera Linn.
A. multiflora Roxb.
A. senegalensis Lamk.
Lawsonia inermis Linn.
Woodfordia fruticosa (Linn.) Kurz

PUNICACEAE

Punica granatum Linn.

ONAGRACEAE

Ludwigia adscendens (Linn.) Hara
L. octovalvis ssp. **sessiliflora** (Mich.) Raven
L. perennis Linn.

TRAPACEAE

Trapa natans Linn. var. **bispinosa** (Roxb.) Makino

CARICACEAE

Carica papaya Linn.

CUCURBITACEAE

Citrullus colocynthis (Linn.) Schrad.
Coccinia grandis (Linn.) Voigt
Ctenolepis cerasiformis (Stocks) Hook. f.
Cucumis callosus (Rottl.) Cogn. ex Cogn. & Harms
Lagenaria leucantha (Duch.) Rusby
Luffa acutangula (Linn.) Roxb.
L. cylindrica (Linn.) M. J. Roem.
Momordica dioica Roxb. ex Willd.
Mukia maderaspatana (Linn.) M. Roem.
Trichosanthes bracteata (Lamk.) Voigt
T. cucumerina Linn.

CACTACEAE

Opuntia elatior Mill.

AIZOACEAE

Trianthema portulacastrum Linn.
T. triquetra Rottl. ex Willd.

MOLLUGINACEAE

Glinus lotoides Linn.
G. oppositifolius (Linn.) DC.
Mollugo nudicaulis Lamk.

APIACEAE (UMBELLIFERAE)

Anethum graveolens Linn.
Coriandrum sativum Linn.
Foeniculum vulgare Mill.

ALANGIACEAE

Alangium salvifolium (Linn. f.) Wang.

RUBIACEAE

Borreria articularis (Linn. f.) F. N. Will.
B. stricta (Linn. f.) Schum.
Dentella repens (Linn.) Forst.
Gardenia resinifera Roth
Ixora brachiata Roxb.
Mitragyna parviflora Korth.
Morinda tomentosa Heyne ex Roth
Oldenlandia corymbosa Linn.
Xeromphis spinosa (Thunb.) Keay
X. uliginosa (Retz.) Maheshw.

ASTERACEAE (COMPOSITAE)

Acanthospermum hispidum DC.
Amberboa ramosa (Roxb.) Jafri
Bidens biternata (Lour.) Merr. & Sherff
Blainvillea acmella (Linn.) Phil.
Blumea bifoliata DC.
B. eriantha DC.
B. membranacea DC.
B. obliqua (Linn.) Druce
B. oxyodonta DC.
Caesulia axillaris Roxb.
Dicoma tomentosa Cass.
Echinops echinatus Roxb.
Eclipta prostrata (Linn.) Linn.
Emilia sonchifolia (Linn.) DC.
Glossocardia bosvallea (Linn. f.) DC.
Gnaphalium indicum Linn.
G. pulvinatum Del.
Grangea maderaspatana Poir.
Laggera aurita (Linn. f.) Sch.-Bip.
Launaea fallax (Jaub. & Spach.) O. Kuntze

Sonchus asper (Linn.) St. Hil.
Sphaeranthus indicus Linn.
Tridax procumbens Linn.
Vernonia cinerea (Linn.) Less.
Vicoa indica (Willd.) DC.
Xanthium strumarium Linn.

LOBELIACEAE

Lobelia alsinoides Lamk.

PRIMULACEAE

Anagallis arvensis Linn. var. **caerulea** Gren. & Godr.

SAPOTACEAE

Madhuca indica J. F. Gmel.
Manilkara hexandra (Roxb.) Hubb.

EBENACEAE

Diospyros melanoxylon Roxb.

SALVADORACEAE

Salvadora oleoides Decne.
S. persica Linn.

APOCYNACEAE

Carissa congesta Wt. & Arn.
Catharanthus pusillus G. Don
C. roseus (Linn.) G. Don
Holarrhena antidysenterica (Linn.) Wall. ex A. DC.
Nerium indicum Mill.
Thevetia peruviana (Pers.) Merr.
Wrightia tinctoria R. Br.

ASCLEPIADACEAE

Calotropis procera (Ait.) R. Br.
Ceropegia bulbosa Roxb.
Dregea volubilis (Linn. f.) Benth. ex Hook. f.
Leptadenia reticulata (Retz.) Wt. & Arn.
Pentatropis spiralis (Forsk.) Decne.
Pergularia daemia (Forsk.) Chiov.
Telosma pallida (Roxb.) Craib.

PERIPLOCACEAE

Hemidesmus indicus (Linn.) Schult.

GENTIANACEAE

Canscora diffusa (Vahl) R. Br.
Enicostema hyssopifolium (Willd.) Verd.
Exacum pedunculatum Linn.
Hoppea dichotoma Willd.
Nymphoides cristatum (Roxb.) O. Kuntze
N. indicum (Linn.) O. Kuntze

HYDROPHYLLACEAE

Hydrolea zeylanica (Linn.) Vahl

BORAGINACEAE

Heliotropium marifolium Retz.
H. marifolium Retz. var. **laxiflora** Cooke
H. ovalifolium Forsk.
H. subulatum Hochst. ex DC.
H. supinum Linn.
Trichodesma amplexicaule Roth
T. zeylanicum (Burm. f.) R. Br.

EHRETIACEAE

Coldenia procumbens Linn.
Ehretia aspera Roxb.
E. laevis Roxb.

CONVOLVULACEAE

Convolvulus microphyllus (Roth) Sieb.
Evolvulus alsinoides (Linn.) Linn.
Hewittia sublobata (Linn. f.) O. Kuntze
Ipomoea aquatica Forsk.
I. batatas (Linn.) Lamk.
I. dichroa (Roem. & Schult.) Choisy
I. eriocarpa R. Br.
I. muricata (Linn.) Jacq.
I. nil (Linn.) Roth
I. obscura (Linn.) Ker-Gawl.
I. pes-tigridis Linn.
I. quamoclit Linn.
I. sepiaria Koen. ex Roxb.
I. sindica Stapf
I. sinensis (Desr.) Choisy
I. triloba Linn.
Merremia aegyptia (Linn.) Urb.
M. gangetica (Linn.) Cufod.
M. tridentata (Linn.) Hall. f.
Operculina turpethum (Linn.) Silva-Manso
Rivea hypocrateriformis Choisy

CUSCUTACEAE

Cuscuta chinensis Lamk.
C. reflexa Roxb.

SOLANACEAE

Capsicum annuum Linn. var. **acuminatum** Fingerh.
Datura metel Linn.
Lycopersicon lycopersicum (Linn.) A. Shaw
Nicotiana tabacum Linn.
Physalis minima Linn.
Solanum melongena Linn.
S. nigrum Linn.
S. surattense Burm. f.
Withania somnifera (Linn.) Dun.

SCROPHULARIACEAE

Bacopa monnieri (Linn.) Penn.
Dopatrium junceum (Roxb.) Buch.-Ham. ex Benth.
Glossostigma diandrum (Linn.) O. Kuntze
Limnophila indica (Linn.) Druce

Limnophila sessiliflora (Vahl) Blume
Lindenbergia muraria (Roxb.) P. Bruehl
Lindernia ciliata (Colsm.) Penn.
L. crustacea (Linn.) F. Muell.
L. oppositifolia (Retz.) Muk.
L. parviflora (Roxb.) Haines
Sopubia delphinifolia (Roxb.) G. Don
Stemodia viscosa Roxb.
Striga angustifolia (Don) Sald.
S. gesneroides (Willd.) Vatke var. **minor** Sant.
Verbascum chinense (Linn.) Sant.

OROBANCHACEAE

Orobanche cernua Loefl. var. **nepalensis** DC.

LENTIBULARIACEAE

Utricularia inflexa Forsk. var. **stellaris** Taylor

BIGNONIACEAE

Dolichandrone falcata Seem. var. **lawii** (Seem.) Haines
Millingtonia hortensis Linn. f.

PEDALIACEAE

Sesamum indicum Linn.

MARTYNIACEAE

Martynia annua Linn.

ACANTHACEAE

Adhatoda vasica Nees
Barleria prattensis Sant.
B. prionitis Linn.
Blepharis maderaspatensis (Linn.) Roth
B. repens (Vahl) Roth
Dicliptera verticillata (Forsk.) Christens.
Dipteracanthus prostratus (Poir.) Nees
Elytraria acaulis (Linn. f.) Lindau
Hemiadelphus polyspermus Nees
Hygrophila auriculata (Schumach.) Heine
Lepidagathis trinervis Wall. ex Nees
Neuracanthus sphaerostachyus (Nees) Dalz.
Peristrophe bicalyculata (Retz.) Nees
Rungia repens (Linn.) Nees

VERBENACEAE

Clerodendrum multiflorum (Burm. f.) O. Kuntze
Gmelina arborea Roxb.
Lantana camara Linn. var. **aculeata** (Linn.) Mold.
Phyla nodiflora (Linn.) Greene
Tectona grandis Linn. f.
Vitex negundo Linn.

LAMIACEAE (LABIATAE)

Anisomeles indica (Linn.) O. Kuntze
Hyptis suaveolens (Linn.) Poit.
Leucas aspera (Willd.) Spreng.
L. biflora R. Br.
L. longiflora Benth.
Moschosma polystachyum (Linn.) Benth.
Ocimum basilicum Linn.
O. canum Linn.
O. sanctum Linn.

NYCTAGINACEAE

Boerhavia chinensis (Linn.) Druce
B. diffusa Linn.
Bougainvillea glabra Choisy

AMARANTHACEAE

Achyranthes aspera Linn.
Aerva lanata (Linn.) Juss.
Alternanthera sessilis (Linn.) DC.
Amaranthus hybridus Linn. ssp. **cruentus** (Linn.) Thell. var. **paniculatus** (Linn.) Thell.
A. spinosus Linn.
A. tricolor Linn.
A. viridis Linn.
Celosia argentea Linn.
Digera muricata (Linn.) Mart.
Gomphrena celosioides Mart.
Nothosaerva brachiata (Linn.) Wt.
Pupalia lappacea (Linn.) Juss.

CHENOPODIACEAE

Chenopodium album Linn.
C. murale Linn.

POLYGONACEAE

Polygonum plebeium R. Br.

LORANTHACEAE

Dendrophthoe falcata (Linn. f.) Etting.

EUPHORBIACEAE

Acalypha indica Linn.
Bridelia squamosa (Muell.-Arg.) Gehrm.
Chrozophora prostrata Dalz.
Euphorbia hirta Linn.
E. neriifolia Linn.
E. orbiculata H. B. K.
E. parviflora Linn.
E. prostrata Ait.
E. thymifolia Linn.
E. tirucalli Linn.
Jatropha curcas Linn.
J. gossypifolia Linn.
Kirganelia reticulata (Poir.) Baill.
Phyllanthus fraternus Webster
P. simplex Retz.

Ricinus communis Linn.
Securinega virosa (Roxb. ex Willd.) Pax & Hoffm.

ULMACEAE

Holoptelea integrifolia (Roxb.) Planch

MORACEAE

Ficus amplissima Sm.
F. benghalensis Linn.
F. hispida Linn. f.
F. racemosa Linn.
F. religiosa Linn.
Streblus asper Lour.

CERATOPHYLLACEAE

Ceratophyllum demersum Linn.

HYDROCHARITACEAE

Hydrilla verticillata (Linn. f.) Royle
Vallisneria spiralis Linn.

HYPOXIDACEAE

Curculigo orchioides Gaertn.

DIOSCOREACEAE

Dioscorea bulbifera Linn.

LILIACEAE

Allium cepa Linn.
A. sativum Linn.
Aloe barbadensis Mill.
Asparagus gonoclados Bak.
A. racemosus Willd. var. **javanicus** (Kunth) Bak.
Asphodelus tenuifolius Cav.
Gloriosa superba Linn.

PONTEDERIACEAE

Monochoria vaginalis (Burm. f.) Presl

COMMELINACEAE

Commelina benghalensis Linn.
C. diffusa Burm. f.
C. forskalaei Vahl
C. hasskarlii Clarke
C. kurzii Clarke
Cyanotis axillaris (Linn.) Schult.
Murdannia nudiflora (Linn.) Brenan
M. semiteres (Dalz.) Sant.

ARECACEAE (PALMAE)

Borassus flabellifer Linn.
Phoenix sylvestris Roxb.

TYPHACEAE

Typha angustata Bory & Chaub.

LEMNACEAE

Lemna paucicostata Hegelm.
Wolffia arrhiza (Linn.) Wimm.
W. microscopica (Griff.) Kurz

ALISMACEAE

Limnophyton obtusifolium (Linn.) Miq.

NAJADACEAE

Najas minor All.
N. kurziana Rendle

APONOGETONACEAE

Aponogeton natans (Linn.) Engl. & Krause

BUTOMACEAE

Tenagocharis latifolia (D. Don) Buchen.

ERIOCAULACEAE

Eriocaulon eleonorae Fyson

CYPERACEAE

Bulbostylis barbata (Rottb.) Kunth
Cyperus alopecuroides Rottb.
C. bulbosus Vahl
C. compressus Linn.
C. difformis Linn.
C. iria Linn.
C. laevigatus Linn.
C. michelianus (Linn.) Link. ssp. **pygmaeus** (Rottb.) Aschers. & Graebn.
C. nutans Vahl var. **eleusinoides** (Kunth) Haines
C. pangorei Rottb.
C. pseudokyllingioides Kukenth.
C. pumilus Linn.
C. pumilus Linn. var. **membranaceus** (Vahl) Clarke
C. rotundus Linn.
C. squarrosus Linn.
C. tenuispica Steud.
C. triceps (Rottb.) Endl.
Eleocharis atropurpurea Kunth
E. dulcis (Burm. f.) Trin. ex Henschel.
E. geniculata (Linn.) Roem. & Schult.
Fimbristylis argentea (Rottb.) Vahl
F. dichotoma (Linn.) Vahl
F. falcata (Vahl) Kunth
F. ferruginea (Linn.) Vahl
F. littoralis Gaud.
F. miliacea (Linn.) Vahl
F. ovata (Burm. f.) Kern
F. schoenoides (Retz.) Vahl
F. sieberiana Kunth
F. tenera Roem. & Schult.
Fuirena ciliaris (Linn.) Roxb.
F. tuwensis Deshpande & Shah
Scirpus articulatus Linn.
S. brachyceras Hochst. ex A. Rich
S. kyllingioides Boeck.
S. lateriflorus Gmel.
S. littoralis Schrad. var. **subulatus** (Vahl) Chiov.

Scirpus maritimus Linn.
S. roylei (Nees) Parker
S. squarrosus Linn.

POACEAE (GRAMINEAE)

Alloteropsis cimicina (Linn.) Stapf
Apluda mutica Linn.
Aristida adscensionis Linn. var. **adscensionis**
Brachiaria ramosa (Linn.) Stapf
Capillipedium hugelii (Hack.) Stapf
Cenchrus biflorus Roxb.
Chloris barbata (Linn.) Sw.
C. dolichostachya Lagas.
Cymbopogon martinii (Roxb.) Wats.
Cynodon dactylon (Linn.) Pers.
Dactyloctenium aegyptium (Linn.) P. Beauv.
D. sindicum Boiss.
Desmostachya bipinnata (Linn.) Stapf
Dicanthium annulatum (Forsk.) Stapf
Dinebra retroflexa (Vahl) Panz.
Echinochloa colonum (Linn.) Link.
E. frumentacea Link.
Eragrostis cilianensis (Linn.) Vig.-Lut.
E. ciliaris (Linn.) R. Br. var. **brachystachya** Boiss.
E. ciliaris (Linn.) R. Br. var. **clarkei** Stapf ex Hook. f.
E. diarrhena (Schult.) Steud.
E. japonica (Thunb.) Trin.
E. pilosa (Linn. f.) P. Beauv.
E. tenella (Linn.) P. Beauv. ex Roem. & Schult. var. **tenella**
E. tremula Hachst. ex Steud.
Eremopogon foveolatus (Del.) Stapf
Eulalia trispicata (Schult.) Henr.
Hackelochloa granularis (Linn.) O. Kuntze
Heteropogon contortus (Linn.) Beauv. ex Roem. & Schult.
Ischaemum rugosum Salisb.
Melanocenchris jaquemontii Jaub. & Spach.
Oryza nivara Sharma & Shastri
O. sativa Linn.
Panicum antidotale Retz.
P. miliaceum Linn.
P. psilopodium Trin.
Paspalidium flavidum (Retz.) A. Camus
P. geminatum (Forsk.) Stapf
Paspalum scrobiculatum Linn.
Pennisetum typhoides (Burm. f.) Stapf & Hubb.
Perotis indica (Linn.) O. Kuntze
Phragmites karka (Retz.) Trin. ex Steud.
Pseudoraphis spinescens (R. Br.) Vickary
Saccharum officinarum Linn.
S. spontaneum Linn.
Setaria glauca (Linn.) P. Beauv.
S. tomentosa (Roxb.) Kunth
S. verticillata (Linn.) P. Beauv.
Sorghum vulgare Pers.
Sporobolus coromandelianus (Retz.) Kunth
S. diander (Retz.) P. Beauv.
Tetrapogon tenellus (Roxb.) Chiov.
Themeda quadrivalvis (Linn.) O. Kuntze var. **quadrivalvis**
Tragus biflorus (Roxb.) Schult.
Triticum aestivum Linn.
Vetiveria zizanioides (Linn.) Nash
Zea mays Linn.

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